

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : GAD ASSAF Docket No. : 96-204
Patent No. : Examiner :
Issue Date : Art Unit :
For : HEAT PUMP SYSTEM AND METHOD
FOR AIR-CONDITIONING



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INFORMATION DISCLOSURE STATEMENT

Hon. Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Dear Sir:

In accordance with the requirements of 37 C.F.R. 1.97 and 1.98, Applicant hereby submits the prior art documents listed hereinbelow, copies enclosed.

1. U.S. Patent No. 2,672,024, issued March 16, 1954, entitled AIR CONDITIONING SYSTEM EMPLOYING A HYGROSCOPIC MEDIUM, By W.L. McGrath. This reference relates to an air conditioning unit wherein the combination of a first air passage, a second air passage, a refrigeration system including a first heat exchange member in the first passage and a second heat exchange member in the second passage, means for directing a stream of air

through the first passage, means for directing a second stream of air through the second passage, means to place a hygroscopic medium in heat exchange relation with the first member and in heat exchange relation with the first air stream to remove moisture therefrom, means for supplying at least a portion of the diluted hygroscopic medium to the second passage, means in the second passage to place the diluted hygroscopic medium in heat exchange relation with the second air stream to transfer moisture thereto thereby concentrating the medium to the first passage, and means to evaporate moisture in the air stream leaving the first heat exchange member.

2. U.S. Patent No. 4,700,550, issued October 20, 1987, entitled ENTHALPIC HEAT PUMP DESICCANT AIR CONDITIONING SYSTEM, By Rhodes. The reference relates to an improved desiccant air conditioning system which includes at least one heat exchanging desiccant bed having desiccant material surfaces defining air passageways through the desiccant bed. The desiccant material surfaces adsorb moisture from building air during an adsorption phase and desorb moisture into exhaust air during a desorption phase. The heat exchanging desiccant bed is formed with refrigerant circulating channels or tubes in

heat exchange relationship with the desiccant material surfaces. A heat pump system is also provided including an evaporator, compressor, condenser, and metering device operatively coupled by a refrigerant and transfer of heat to the refrigerant from air in the evaporator air passageways during a coincident desorption/condensation phase. the refrigerant circulating channels are operatively coupled in the refrigerant circulating line of the heat pump system so that the heat exchanging desiccant bed comprises either the evaporator or the condenser or a component element of the evaporator or condenser. Various combinations of desiccant bed elements and heat pump elements are described. A heat pump desiccant bed air conditioning system is also provided by operatively coupling a heat pump between sources of relatively hot and cold heat transfer liquid of a non-change of phase heat transfer liquid circulating heat exchanging desiccant.

3. U.S. Patent No. 4,941,324, issued July 17, 1990, entitled HYBRID VAPOR-COMPRESSSION/LIQUID DESICCANT AIR CONDITIONER, By Peterson et al. This reference relates to a hybrid air conditioning system which simultaneously dehumidifies and cools air using standard vapor-compression equipment and aqueous solutions of liquid desiccant. By

using a circulating liquid desiccant and an adiabatic humidifier, a more efficient refrigerant cycle is utilized. Moreover, conditioned air can be delivered at the same temperature and absolute humidity as conventional vapor-compression systems but without over-working the compressor.

4. U.S. Patent No. 2,798,570, issued July 9, 1957, entitled AIR CONDITIONING, By Kelley. This reference relates to a method of an apparatus for controlling the moisture content of air by means of a hygroscopic solution. Continuous conditioning of air to very low dew point ranges and to very low temperatures presents some special problems and multiplies existing problems. When mechanical refrigeration is used in the stream of air to be controlled, there is a distinct problem of condensation upon the cooling surfaces, which becomes frost or ice when use in low temperature ranges below 32 deg. F. The lower the temperature the lower the dew point, and the greater the moisture removal the more frost or ice is deposited upon the cooling surfaces and the less efficient they become, to the end that the cooling surfaces must be removed from service to remove the frost or ice so accumulated. When the required dew point of the treated

air is much lower than 32 deg. F., or such as requires cooling of the treated air to substantially below 32 deg. F., this frosting problem becomes so great as to require substantial duplication of equipment for down time, and operating costs are also greatly increased. As the moisture removal load increases the heat removal load increases but the efficiency of the apparatus is reduced because of frost on the cooling surfaces.

5. U.S. Patent No. 2,952,993, issued September 20, 1960, By Bosworth Jr., entitled AIR CONDITIONER. This reference relates to an air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, means for storing an odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, means for passing condenser cooling air over said condenser, means for passing a portion of said condenser cooling air through said odor absorbing medium containing odors desorbed from said air to desorb said medium, and means for returning said desorbed odor absorbing medium to said storing means.

6. PCT International Publication No. WO 99/26026, published May 27, 1999, By Forkosh, entitled DEHUMIDIFIER SYSTEM. This reference relates to a dehumidifier system including a dehumidifying chamber into which moist air is introduced and from which less moist air is removed after dehumidification; a desiccant solution situated in at least one reservoir to the dehumidifying chamber, said solution being returned to said at least one reservoir after absorbing moisture from the moist air, a regenerator which receives desiccant solution from said at least one reservoir and removes moisture from it; a second conduit via which desiccant is transferred from the at least one reservoir to the regenerator, said solution being returned to said at least one reservoir after moisture is removed from it; and a heat pump that transfers heat from the solution in the first conduit to the solution in the second conduit.

Copies of the foregoing patents are enclosed herewith along with a listing on form PTO-1449.

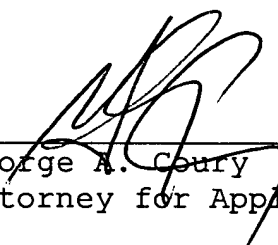
The undersigned submits the above-identified references for independent consideration by the Examiner and does not make any admission that these references are or are not material to the present invention or that these

references are or are not prior art with respect to the present invention.

If any fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184. A duplicate copy of this paper is enclosed herewith in connection with any deposit account charge.

Respectfully submitted,

GAD ASSAF

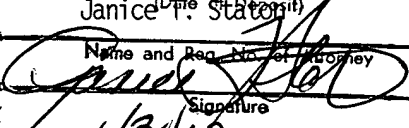
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Date: January 30, 2002

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I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231

on January 30, 2002
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